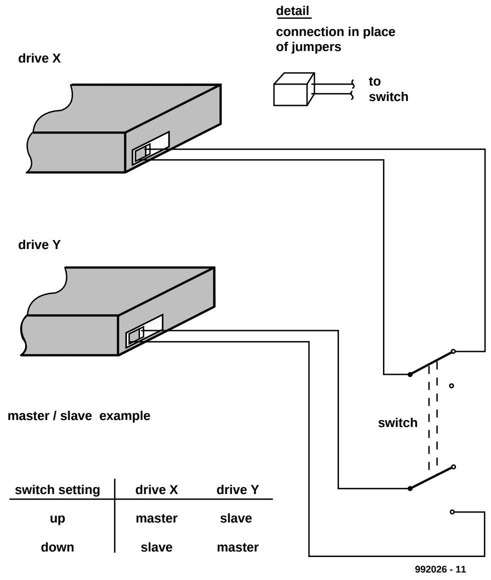
Although two drives are more expensive than a single drive with the same net capacity, two smaller drives are better than one large drive! With multiple drives you simply have more options. The most important of these relates to backups. Since it is unlikely that both drives will fail at the same time, copying the contents of one drive to the other one provides a quick way of making a backup. In addition, with a bit of construction, one can manage to solve the problem of how to run two separate software systems on a single PC.

By Dr W. Matthes

how many drives?

All about switchable two-disk configurations and tape cassette drive installation



switch setting	drive X	drive Y
up	master	slave
down	slave	master

Figure 1. A simple drive switching arrangement.

A ‘simple and stupid’ drive-switching solution

Figure 1 shows how a simple double-pole changeover switch can be used to select either one of two drives as the master drive. All that is necessary is to switch the jumper connections which determine the disks’ master/slave configuration (as identified in the documentation). One can then (for example) install a ‘traditional’ DOS/Windows 3.x system on one drive and (after switching over) install a newer version or a different system (such as Windows 95, OS/2 or Linux) on the second drive. Since one of the drives is always the slave drive, all files of both systems are always accessible (assuming that both systems use a common file structure — such as the DOS FAT system — or that there is appropriate operating-system support, such as with the OS/2 hpfs).

Notes

1 *Practical construction (1):* use female connectors in place of the jumpers. These can be sawn from a double-row header and filed on the sides so that they fit between the jumper pins.

2 *Practical construction (2)*: one switch section is needed for each jumper position. At minimum a double-pole switch is required.

3 *Operation (1):* actual switchover often only happens after the machine has been switched off.

4 *Operation (2):* modifying the Setup parameters. If both drives are the same type then no modifications are necessary. Otherwise the following operational procedure is required: (1) switch off the system; (2) throw the changeover switch; (3) switch on the system; (4) call Setup (eg with [Del]) and (5) enter the master and slave drive parameters (if you have a ‘handy’ DOS version, start AUTO DETECT and confirm the returned parameter values). This may all sound a bit a complicated, but nonetheless you can in this manner quickly install a completely new operating system environment and work with it. If there are problems, it only takes about five minutes to restore the old system — and all of your files are still accessible.

Switching a drive off-line

IDE drives cannot normally be switched ‘off line’ via a jumper. You can work around this by breaking the interface Reset line (easily done since it is lead 1, at the outer edge of the cable). The drive which is to be placed out of service is held permanently reset by a simple switch. This arrangement can be added to the disk changeover switch. **Figure 2** shows how it is done.

Tape cassette drive

This section briefly describes how to connect a backup drive to the floppy-disk interface.

Conventional tape cassette drives. Traditionally the tape drive is attached in place of a floppy- disk drive. In PCs with one floppy-disk interface the tape drive thus replaces drive B:. The floppy- disk drive B: must then be 'deleted' in Setup. In principle the tape drive may be configured in place of any floppy- disk drive except for drive A:, since there is no BIOS support for a cold start from a tape drive.

Drive switching (1)
Two floppy-disk drives and a single tape drive can be used on a single interface by switching the Drive Select and Motor Enable signals (see **Figure 3**). Appropriate cables with built-in switches are commercially available, but you can also make your own. Separate the proper leads from the flat cable, cut them, and solder on extension leads as necessary. Don't forget to insulate the connections (preferably with heat-shrink tubing).

Drive switching (2)
With this approach the interface cable remains intact. Instead of modifying the cable, the drive select jumpers of the floppy-disk and tape drives are replaced by a changeover switch and associated cabling (see **Figure 4**).

Modern tape drives.
Modern drives are designed such that one tape drive and two floppy-disk drives can be used on a single (unmodified) interface. Note: usually the existing interface cable can remain in place; a special branched cable ('Y-cable') is used to connect the tape.

Practical tip
Configure the cassette tape drive as drive B:, delete floppy-disk drive B: in Setup and address the second floppy-disk drive via a different drive letter. While this does not save you from having to switch over the drives, it does mean that you do not have to restart the PC every time you do so. You can use the DRIVER.SYS command in the config.sys file to assign drive letters. For example, to configure a 5⁄" floppy-disk drive enter

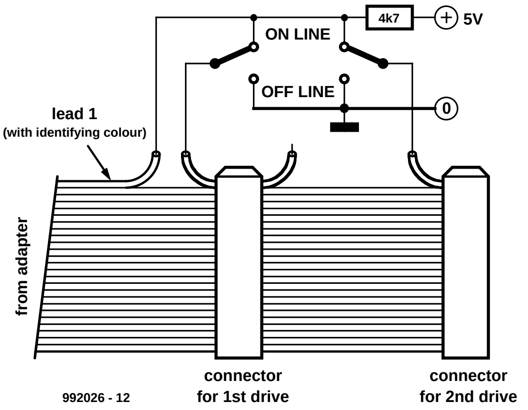


Figure 2. Drive on-line/off-line switch.

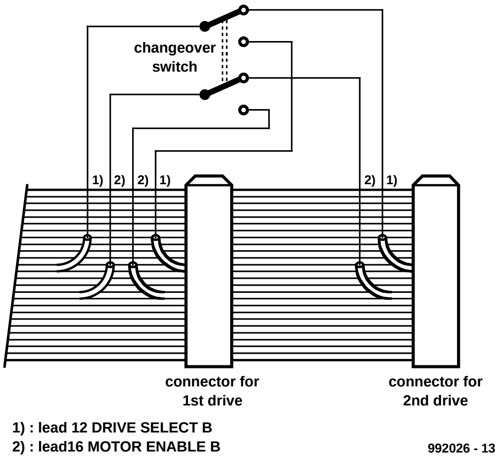


Figure 3. Drive switching via the interface cable.

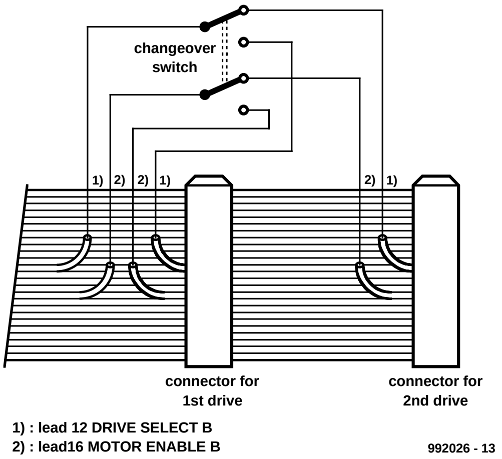


Figure 4. Drive switching via the Drive Select jumpers.

```
DEVICE=C:\DOS\DRIVER.SYS /D:1
/C /F:1
```

This assigns the next free drive letter after that of the last hard-disk drive

Notes
1 This technique can also be used to operate three floppy-disk drives on a single interface. You must of course switch the drives over (drive B: and drive F:, for example) according to which drive is to be used.
2 Tape drives normally do not need drive letters, since they are accessed via special device drivers instead of via the BIOS and DOS.

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